

# What is the working principle of steam turbine?

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14 Answers



Mohit Aggarwal, B.Tech Mechanical Engineering, JSS Academy Of Technical Education, Noida (2017)

Answered Oct 31, 2017



Dear Nikhil,

Steam turbine works on simple principle:

The steam generated from boiler is directed towards the steam turbine and the enthalpy of steam starts reducing which rotates the steam turbine.

Going on the mechanism principle of steam turbine depends either its impulse or reaction turbine.

In Impulse turbine the nozzle converts the pressure into velocity and due to high velocity of steam the blades start rotating.

In Reaction turbine the steam passes through the fixed blades and than moving blades... Due to pressure difference b/w turbine exit and entry the turbine rotates.

Best wishes

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S.K. Mani, B.E. Mechanical Engineering, PSG College of Technology, Tamil Nadu, India (1964)

Answered Feb 20, 2017



Originally Answered: What is the application of steam turbine?

- Steam turbines are Ideal wherever Steam is available.
- Let us look at turbines first and there are two types of Turbines a. Steam turbine. b. Gas turbines. Both use a fluid of gous nature at high temperature at high pressure to generate power or if they are driver bu another device like a motor or any other prime mover to compress fluid.
- Steam Turbines can be used at very wide range of speeds as compared to gas turbines which are required to run at high speed to have better efficiency/
- First commercial applications were developed in steam engines and a little later Locomotives. With development Automobile running on Gasoline or diesel the gas turbines were delayed
- Advantages of a Gas Turbine is It does not require a boiler or a steam generator. While steam boiler is versatile in that it can burn almost any kind of fuel of fuel. Gas turbines require clean fuels like Gas, aviation kerosine etc. are needed.
- Steam nowadays used in many stationary applications. Gas turbines are used in mobile applications.
- Tlingit recently steam was used because of safety considerations. The boilers are separate equipments and can be safely operated independently. Gas turbines are compact it equally efficient.
- Efficiency of steam devices were plagued by the latent heat required to convert to stem and is only recovered in the feed water. But in very large power boilers which operate above 150 ata/kg per cm<sup>2</sup> . Water converts into steam without adding latent heat. Such boilers have very high efficiency but operation/design are extremely sophisticated and


requires great knowledge. It is very important that controls of such boilers two phase operations very difficult.

- When ever you have cheap or free fuel is available like sugar factories they use cane bagasse and burn as fuel to generate steam for the process. Modern trend is to raise the steam at higher efficiency generate power for running the factory and needed steam for the process at right pressure and temperature for process. This is followed in many process industries. It is even used for desalination at below atmospheric pressure and almost very low boiling points. Whenever power is generated steam turbine is used.
- As gas turbines are compact easy to start and in conditions where power generation is prime requirement exhaust from Gas Turbines are used generate steam and power and process steam is obtained.
- Thus almost all land based applications both steam and Gas turbines are used as they less complicated, steam is more preferred.
- But Aircraft engines are exclusively Gas Turbines because of weight considerations.
- Other uses as prime movers for compressors etc.

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PARTH SHAH, Relentlessly trying to excel engineering  
Answered May 9, 2016



As we know that we can convert electrical energy into rotational motion(MOTOR) same way we can convert rotational motion into electrical energy also.

And for that we uses steam turbine in which expansion of steam takes place and the rotor of turbine will rotate which is connected to generator and further electricity will produce.

So basically we know from basics of thermodynamics that  $dh = v dp$  (i.e. change in enthalpy equals to multiplication of specific volume and change in pressure)

SO in turbine we supply high pressure, high velocity steam and this pressure and kinetic energy will transfer to rotor by momentum transfer principle,

this way turbine operate.

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Nakul Dev, Mechanical Engineering Guy ,Working till my success

Answered May 8, 2016



Have you ever seen your lighting bulb and question how these things arrive to us ? well if not here i have answer for you , Electricity is generated by steam power plants,Nuclear power plants and many more .

Here i am explaining you the principle of steam turbine-

- The very first thing which is necessary in steam power plants is availability of steam .  
Thanks to the '*Boilers*' who made this possible . A very high pressure steam ( generally it is called super heated steam) is generated in the boilers by boiling of water .
- Then these boilers are fed to the nozzles (A device of reducing cross section area used to augment the velocity of fluid on the expense of its pressure)
- Then this fluid passes through the and come out with a high velocity ( may be 600-800m/sec)
- These high velocity are fed into the turbine ( a device which consists of Rotor where blades are built and Rotors are mounted on the shaft ) and this high velocity steam strikes the blades making the blade to rotate with 30,000-40,000 RPM .

well in india the frequency of AC is 50hertz which can only be made possible by if rotor are allowed to rotate at 3000rpm but above i have mentioned its 30K-40K RPM so ,how it is possible to get

the desired frequency at such a high rotational speed? . Well I won't be explaining that. **"You only asked the principle . :P"**

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Himanshu Jaiswal, student

Answered May 9, 2016



A **steam turbine** is a device that extracts thermal energy from pressurized steam and uses it to do mechanical work through the rotation of turbine blades and shaft.

An ideal steam turbine is considered to be an isentropic process, or constant entropy process, in which the entropy of the steam entering the turbine is equal to the entropy of the steam leaving the turbine. No steam turbine is truly isentropic, however, with typical isentropic efficiencies ranging from 20–90% based on the application of the turbine.

The turbine generates rotary motion, which suited to be used to drive an electrical generator. The steam turbine is basically a form of heat engine that derives much of its improvement in thermodynamic efficiency from the use of multiple stages in the expansion of the steam.

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Hitul Agarwal, Chief Executive Officer

Answered Apr 10



Originally Answered: What is the working principle of a steam turbine?

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this way turbine operate.

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Dhiraj Lanjewar, studied Mechanical Engineering

Answered Feb 19




Originally Answered: What is the application of steam turbine?

Steam turbine can be considered as the main working unit of a power generation plant. Steam turbine is connected to power generator and has blades. The steam is generated in the boiler and then it is passed by using nozzle to the turbine. The steam from the nozzle is at high speed and it is allowed to fall on the blades of the turbine. Thus the blades are rotated and the rotating blades connected to the generator generates electric energy.

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Robert Bray, Batchelor of Architecture Sustainable Technology & Architecture, University of the Witwatersrand (1980)

Answered Sep 9, 2017



A water reservoir in the form of a sealed pressure vessel (boiler) is heated on a burner incinerating natural gas, coal, diesel, nuclear fission, geothermal heat or bio fuel. The heated water boils and goes through a change of state to become a gas (steam). This gas requires a much larger volume than it requires in the form it was as water. The boiler is a fixed size so the pressure increases due to the creation of the steam. This steam is released through injection nozzles at high pressure and velocity onto the inclined cambered blades of a rotor attached to a rotating shaft. The shaft then drives a generator making electricity. The steam passes through the turbine blades and is generally recondensed and collected for reuse. The burnt heating medium is collected and taken to waste dumps or recycled as ash in products such as cement.

The heating used in powered steam turbines generally comes from fossil fuels and burning this fuel produces pollutants into the atmosphere contributing to poor air for breathing and global warming.

It is possible to heat the boiler with electrical immersion heaters powered by wind, hydro or tidal renewable energy and if this is done the steam turbine is a very sustainable way of generating electricity.

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Maulik Naik, Basic design of steam turbines from 8 years  
Answered May 24, 2017



Steam turbine extracts the thermal energy from pressurized steam, which comes from boiler and uses it to do mechanical work on a rotating output shaft.

Since, turbine generates rotary motion, mostly it is coupled with electrical generator. The generator generates electricity.

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Alok Yadav, Engineer  
Answered Nov 6, 2016



The thermal energy is converted in to mechanical energy

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Lokeshreddy Xtron, Production Department (2017-present)  
Answered Dec 8, 2017



In short I am explained in watter is boiled in boiler in 530degree temp that time watter is conversation in steam it is a one type gas as same like water form this steam is enter the turbine the turbine is roating in inside that time enter the steam in turbine inside is nozzles is there in inside nozzles is roating in continually the enter the steam in also roating in forcely that time kinetic energy is connected in to the electrical energy

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[Comment](#)[Recommended](#) [All](#)**Preshit Patil, Hereafter Mechanical Engineer**

Answered May 3, 2017



Originally Answered: What is the application of steam turbine?

In steam power plants fuel is burn inside a boiler.boiler generates high pressure steam which is steam turbine.turbine rotates and convert steam into mechanical work.This generated mechanical work is converted into electrical energy with the help of generated.

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[Comment](#)[Recommended](#) [All](#)**Bharat Balaji D, former HVAC Site Engineer at JVS Air Systems**

Answered Nov 12, 2017



Originally Answered: At which principle steam turbine works?

- The steam energy is converted Mechanical work by expansion through turbine.
- Expansion take place through a series of fixed and moving blades.
- In each row, fixed blade and moving blade are called stage.

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[Comment](#)[Recommended](#) [All](#)**Samina Naz, former Interested in technology and engineering. at Self-Taught, Self-Experienced**

Answered Aug 24



Originally Answered: How is the working of a steam turbine?

A steam turbine is a machine that uses pressurized steam to do **mechanical**work on a rotating output shaft.More details here: